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FEASIBILITY INVESTMENT ANALYSIS OF SUGARCANE PLANTER MACHINE IN PRADJEKAN SUGARCANE FACTORY PT. PERKEBUNAN NUSANTARA XI INDONESIA

ARIF SUGIANTO[1], ISTI FADAH[2] & HARI SOEKARNO[3]

[1,3]*Magister Management, Faculty of Business and Economic, University of Jember, East Java, Indonesia*

[2]*Department of Management, Faculty of Business and Economic, University of Jember, East Java, Indonesia*

ABSTRACT

The increasing demand for sugar in Indonesia is not followed by the number of workers in the field of plantations resulting in the fact that sugar mills have difficulties in their operations. Therefore, this study aimed to analyze an investment feasibility of sugar cane planter machine in sugar cane factory in Bondowoso Indonesia namely Pradjekan Sugar cane Factory. Investment feasibility of sugar cane planter machine has done by using financial indicators such as Net Present Value (NPV), Discounted Payback Period (DPP), Profitability Index (PI) and Internal Rate Return (IRR). The analysis used data from Assembagoes Sugar cane Factory, which has used sugar cane planter machine in their planting activities. The results showed that sugarcane planter machine worth to be invested in the Pradjekan Sugarcane Factory.

KEYWORDS: Feasibility Investment, Sugarcane Planter Machine, NPV, DPP, PI & IRR

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INTRODUCTION

In Indonesia, sugar is one of the basic needs of food and is a strategic food commodity after rice (Maria, 2009). National sugar demand continues to increase in line with increasing of population, food and beverage industry, hotel and restaurant. Based on the results of the National Socioeconomic Survey of 2015, the average sugar consumption per-capita per month was 5.95 ounces, with a projected population of 2015 by 255.446 million people, it is estimated that the consumption of sugar in 2015 will reach 5.7 million tons. The amount of domestic sugar production in 2015 reached only 2.53 million tons. On the other hand, the availability of farmers in Indonesia is currently mostly at the age of 45 years and over, with low average education and still using conventional methods. Data from the Agricultural Extension and Development Agency (BPPSDMP) of the Ministry of Agriculture of The Republic of Indonesia stated that there was a decrease in agricultural labor absorption by 0.64% per year. "The lenth the workforce who work in agriculture is getting less," said Head of Education BPPSDMP Ministry of Agriculture RI, Dr. drh. Maya Purwanti, M. S.

One that can be done by the government and sugar factory is to conduct a technical intensification program of sugarcane cultivation. One of the organizations assigned by the government to run the technical intensification program of the development of sugarcane cultivation is a sugar factory belonging to the Ministry of SOEs, one of them is PradjekanSugarcane Factory PT. Perkebunan Nusantara XI located in Bondowoso Regency. Pradjekan Sugar cane Factory is a Neutral Sulfitation sugar cane factory for the type of process and produces

White Crystal Sugar (GKP I). An intensification program of sugarcane breeding, which is being proclaimed by PT. Perkebunan Nusantara XI Pradjekan Sugar cane Factory one of them is cultivation based on mechanization. Cultivation activities based on mechanization is the cultivation activities using tools and agricultural machinery. One of the activities of sugar cane cultivation that will be developed by mechanization is planting activities. Therefore, this study was conducted to assess the feasibility of investing Sugarcane Planter Machine at PradjekanSugarcane Factory.

RESEARCH METHODS

The Population of this research was an operational report of sugar cane planting machine for 3 periods of Assembagoes Sugar cane Factory of PT. Perkebunan Nusantara XI located in Situbondo Regency of East Java Province. The population data required for this study can be obtained so that the study sample is not required for the calculation.

Sugarcane planting activity observed is the activity of sugar cane planting manually and mechanically. Then will be recording capacity of planting activities between manual and mechanical planting. There are some differences between manual and mechanical planting activities. Here is the sequence of cultivation activities of cane cultivation by planting manually and mechanically.

Table 1: Sequence of Cane Cultivation Activity by Manual andMechanical Planting

Manual Planting	Mechanical Planting
1. Plow 1	1. Plow 1
2. Plow 2	2. Plow 2
3. Furrow	3. Mechanical planting :
4. Fertilize 1	- Furrow
5. Planting	- Fertilize 1
	- Planting

Manual planting activities carried out the sequence of cultivation activities are plow 1, plow 2, furrow, fertilize1 and planting. While in mechanical planting activities the sequence of cultivation activities are plow 1, plow 2 and mechanical planting (furrow, fertilize 1 and planting done simultaneously).

Value of variables needed in this research are Cash Flow, Initial Investments (I_0) and the Interest Rate (i).

Cashflow (CF)

Determining the cash flow value is done by estimating the cash flow

$$E(CF) = E(profit) + E(depreciation)$$

Estimated earnings or E (earnings) are earned by calculating the average company's profit for 6 years from 2011 to 2016.

Depreciation estimates or E (depreciation) uses straight line calculations.

$$E(depreciation) = \frac{acquisition\ value - residual\ value}{economic\ time}$$

In the business, there is an uncertainty in income so that cash flow must be calculated in some conditions. The condition is over selling, normal, a and under selling condition.

Table 2:Cash Flow Estimates Based On Multiple Revenue Conditions

Conditions	P_i	E(laba)	E(CF)
Overselling	P_i (Overselling)	$\bar{X}$ profit + x%	$\bar{X}$ profit + x% + E (depreciation)
Normal	P_i (Normal)	$\bar{X}$ profit	$\bar{X}$ profit + E (depreciation)
Under selling	P_i (Under selling)	$\bar{X}$ profit - x%	$\bar{X}$ profit - x% + E (depreciation)

Cash flow estimates at the time of normal condition is estimated earnings plus estimated depreciation. At the time of the use of cultivation tools over selling, cash flow estimation resulted from the average profit and the percentage increase in profit plus depreciation estimation. While at the time of under selling, cash flow estimation resulted from the sum of the average earnings minus the percentage decrease in profit plus the depreciation estimate.

$$DPP = \text{investment} / \sum_{t=0}^{n} CF_t i_t$$

Known:

DPP = *Discounted Payback Period* I = Interest rate

CF_t = Cash Flow t

Net Present Value (Npv)

The analysis with the Net Present Value (NPV) method is to assess whether the proposed investment is feasible to run by subtracting between Present Value and net cash flow of investment operations over the life of the economy including cash flow and initial cash flow. There are several models of Net Present Value method calculation.

$$NPV = \sum_{r=0}^{n} \frac{Cashflow_n}{(1+r)^n} - investment$$

Internal Rate Of Return (IRR)

The Internal Rate of Return analysis is used to determine the investment feasibility by comparing the IRR with the expected profit level of the investor. The IRR value of an investment can be known by the equation.

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2}(i_2 - i_1)$$

Known:

IRR = *Internal Rate of Return* i_1 = Low interest rate

NPV_1 = NPV positive I_2 = High interest rate

NPV_2 = NPV negative

Profitability Index (PI)

The profitability Index method is also called Benefit Cost Ratio analysis method. The investment feasibility of using this analysis is to compare Present Value of investment cash flow with Present Value (Initial Investment). If PI> 1 then the investment is declared eligible and if PI <1 then investment declared not feasible.

$$PI = \frac{\sum PVcashflow}{\sum PV\ Investment} x\ 100\%$$

The PI method is often called the Desirability Index, which is a method of calculating the comparison between the present value of net cash receipts in the future with the present value of investments. If an investment is not the same size from year to year, then as with the NPV method, to calculate the PI must calculate the Present Value of Proceeds each year in advance to sum it up to obtain the present value amount of the overall expected proceeds of the investment.

THE RESULT OF DATA ANALYSIS

Land planted in the Pradjekan Sugarcane Factory is an unloading ration land or new land planted with sugar cane. There was a decrease of unloading reactionon pattern into plant cane at PradjekanSugarcane Factory. But since 2016, the area of plant cane began to show a significant increase. from 2008 to 2017, the average plant cane area of Pradjekan Sugar cane Factory is 517.9 ha.

Manual planting has several sequences of work such as plow 1, plow 2, furrow, fertilize 1 and planting. While in mechanical planting has the order of plow 1 and plow 2. For the activities of the furrow, fertilize 1 and planting done simultaneously by using sugar cane planting machine. In manual planting activities, start with plow 1 and plow 2 using a tractor. After that continued the activity of the furrow which is also done by using the tractor has a capacity of 0.5 ha per hour at a cost of IDR 700,000 per ha and up by 5% per year. The activity of fertilize 1, done manually using human labor as much as 6 people with the cost of IDR 25,000 / person so that cost needed for fertilize activity 1 is IDR 150,000 / haFor manually planting activities, it requires 60 people so it costs as much as IDR 1,500,000 / ha and an 8% increase per year.

The mechanical planting activity also begins with the activities of plow 1 and plow 2 by using a tractor. But unlike the manual planting activities, the mechanical planting activities for the furrow, fertilizer 1 and planting is done simultaneously by using sugar cane planting machine. The capacity of this mechanical planting activity is 3 ha / day with 135 days workday per year, so that this planting machine can be used for planting activity of 405 ha / year. This planting machine is operated by 1 operator and 4 people feeding seed and fertilizer into planting machine. This mechanical planting activity requires a fee for operators and feeder of IDR 295,000 / day or IDR 98,333 / ha and an increase in cost of 14% per year.

The investment value of this planting machine is IDR 1.035,000,000 with the economic life of this machine is 6 years and without residual value. The cost of this investment has been come from bank loans with a capital cost of 9.5% per annum for 6 years. This planting machine also has machine operational costs such as solar and maintenance cost. The amount of solar required is as much as 75 liters per ha with a cost of IDR 696,648 and an increase of 19% per year. The cost of maintenance required by this machine is IDR 255,556 per ha and increase by 5% per year.

DISCUSSIONS

Estimation of Plant Cane Land Area

It is known that the average plant area of plant cane in Pradjekan Sugar cane Factory is 517,9 ha and has deviation standard value equal to 271,7 ha. In 2018, PTPN XI Eastern Region will cooperate with the provincial government of Bali for the expansion of an area of 5000 ha. This will increase the amount of land that must be planted so that the mechanical planting machine can operate in accordance with its capacity.

Table 3:Plant Cane Land Estimation

Condition	Average Area (ha)	Estimated Area (ha)
On-season	518	405
Normal	518	325
Off-season	518	246

According to Pradjekan Sugar cane Factory Plant Manager, the occurrence rate of the plant cane area, condition can be estimated, so that it can predict the extent that will be processed for the plant cane. The following is an occurrence rate table of certain conditions in the Pradjekan Sugar cane Factory.

Table 4: Occurrence Rate of Plant Cane Area

Condition	Occurrence Rate (%)
On-season	50
Normal	35
Off-season	15

This occurrence rate is also reinforced by the road map of PradjekanSugarcane Factory, which is a government program in increasing the amount of national sugar production. A Road map that will be done by Pradjekan Sugar cane Factory is by extensification of sugarcane plantation land. This land extensification will be done by expanding the sugar - cane planting, cooperating with the provincial government of Bali. The area of land that will be planted with sugarcane is about 5,000 ha.

Activity Charts and Costs of Manual Planting

The series of manual cultivation activities consists of several activities such as furrow activities, planting, and fertilizing. Manual planting activities incur costs and increments of different magnitudes per sub-activity per year. The following are the flow of costs of manual cultivation activities.

Table 5: Manual Planting Costs

Year	Manual Planting Costs
1	829.902.500
2	886.547.760
3	947.176.693
4	1.012.075.991
5	1.081.553.328
6	1.155.938.921

Activity Charts and Costs of Mechanical Planting

The series of mechanical planting activities consist of furrowing, planting and fertilizing done together. Mechanical planting activities also incur a cost that consists of the cost of equipment and the operational cost of the tool.

Table 6: Mechanical Planting Costs

Year	Mechanical Planting Costs
1	370.997.281
2	427.115.500
3	493.021.348
4	570.508.855
5	661.706.575
6	769.140.393

Cash Flow Projection from Sugar cane Machine Investment

Costs incurred by manual and mechanical planting activities, resulting in a projected cash flow investment in this planting machine. In addition to manual and mechanical planting costs, there is also the cost of depreciation tools, interest on loans, and taxes. Here is a cash flow projection of sugar cane machine investment.

Table 7: Investment Cash Flow Projection

Year	Cash Flow
1	322.964.175
2	323.385.808
3	319.164.277
4	309.093.708
5	291.717.403
6	265.278.822

Financial Analysis, Feasibility of Plant Sugarcane Planting Investment

In order to facilitate the feasibility analysis of sugarcane machine investment, several analytical methods such as Discounted Payback Period (DPP) analysis, Net Present Value (NPV) analysis, Profitability Index (IR) and Internal Rate Return (IRR) analysis were used.

Discounted Payback Period (DPP)

Discounted Payback Period is a method used to calculate the length of the period required to return the money invested from the annual cash inflows generated by the investment project. The value of the Discounted Payback Period for this planting machine investment is 3 years 11 months.

Net Present Value (NPV)

The analysis with the Net Present Value (NPV) method is to assess whether the proposed investment is feasible to run by subtracting between Present Value and net cash flow of investment operations over the life of the economy including cash flow and initial cash flow. The value of Net Present Value of this investment of the sugarcane plant is IDR 1,684,905,886,-

Profitability Index (PI)

The profitability Index method is also called Benefit Cost Ratio analysis method. The investment feasibility of using this analysis is to compare Present Value of investment cash flow with Present Value (Initial Investment). The value of Profitability Index of sugarcane machinery investment is 4.62. The result of this research also corresponds to the result

of research Nely et al (2013)

Internal Rate Return (IRR)

The Internal Rate of Return analysis is used to determine the investment feasibility proposal by comparing the IRR with the expected profit level of the investor. The Internal Rate of Return (IRR) is used to find out what rate of return of an investment (expressed in percentage) when NPV is zero. This IRR will be compared to the capital cost incurred in the investment. If the IRR of such investment is greater than the cost of capital, then the investment is profitable because the rate of return can certainly cover the cost of capital. Value of Internal Rate of Return of investment of sugar cane planting machine is equal to 18,01%.

CONCLUSIONS

This research aimed to analyze the feasibility of sugar cane machine investment based on the financial aspect. To analyze the investment feasibility of sugar cane planting machine used several analytical methods such as Discounted Payback Period (DPP), Net Present Value (NPV), Profitability Index (PI) and Internal Rate of Return (IRR). Based on the results of research and calculation analysis with the above methods, it can be concluded that the investment of sugar cane planting machine is feasible to do, because the value of the Discounted Payback Period was shorter than the economical age of the planting machine, the value of Net Present Value was more than 0, the value of Profitability Index was more than 1, and the value of Internal Rate of Return was greater than the cost of capital used for investing sugar cane machine.

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